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# Weathering of glaciogene marine clays from West Greenland

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Deposits of fine-grained marine glaciogene sediments have been observed throughout the previously glaciated parts of the Northern hemisphere. Their particles were formed during glacial erosion of bedrock and deposited in marine environments during the retreating phases of the last glaciation. Although the sediments are distributed over a large geographical area, their overall grain size distributions and qualitative mineralogies are similar. They are dominated by the < 60 µm fraction (clay and silt fractions) and contain only minor amount of the 60-2000 µm fraction (sand fraction) (Belmonte et al., in prep.; Gillott, 1979; Pederstad and Jørgensen, 1985). Their chemical compositions are dominated by $SiO_2$ (46-63 wt%), $Al_2O_3$ (14-23 wt%) and $Fe_2O_3T$ (4-15 wt%) with an alkali-alkaline earth element content (i.e. the content of $K_2O$, $Na_2O$, MgO and CaO) of 12-16 wt % (Bentley and Smalley, 1978; Gillott, 1971; Locat et al., 1984; Pederstad and Jørgensen, 1985; Roaldset, 1972). They often consist of feldspars, quartz, amphibole, mica/illite, chlorite, expandable clay minerals (e.g. smectite, vermiculite and mixed layer clays) and their < 2 µm fraction (clay fraction) contain a high percentage of primary minerals such as quartz, feldspars and amphibole (Belmonte et al., in prep.; Foged, 1979; Bentley and Smalley, 1978; Gillott, 1971; Gillott, 1979; Locat, 1984; Pederstad and Jørgensen, 1985; Ramesh and d'Angeljan, 1995; Roaldset, 1972).

The presence of the expandable clay minerals raises the question of their origin, for which there are several possibilities. They could have resulted from pre-glacial or sub-glacial weathering of bedrock, weathering in the pro-glacial fluvial system, weathering under marine conditions or, for some, weathering after exposure to sub-aerial conditions.

In this study, marine sediments from West Greenland have been characterised according to their grain size, clay mineralogy, plastic properties and pore water chemistry. The samples were selected to represent environments above and below present day sea level, and with and without permafrost in order to investigate the influence of the different environments on the weathering properties. We argue that the content of expandable clay minerals in the clay fraction indicates that chemical weathering must have been an active process during glacial erosion of bedrock, in deposition in seawater and/or after subaerial exposure.

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